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## CIRAS News (Vol. 39, No. 1)

Iowa State University Center for Industrial Research and Service

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**CENTER FOR INDUSTRIAL RESEARCH AND SERVICE**

Partnering with the Iowa Manufacturing Extension Partnership

IOWA STATE UNIVERSITY

University Extension

IOWA STATE UNIVERSITY

College of Engineering

**Check out pages 6 and 7 for a historical CIRAS timeline.***Celebrating 40 years of service to Iowa industry***INSIDE**Iowa Energy Center:  
Enhancing the value  
of Iowa's products  
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manufacturing**Page 4**Contracting with the  
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CIRAS annual report

**Page 9-10****Company upgrades with eye to future***By Andrew Bice, CIRAS**Andrew Bice and Matthew Canny work on an I/O Board*

Lloyd Table Company, located in Lisbon, Iowa, is one of the largest manufacturers of chiropractic adjusting tables in the world. In an effort to remain a leader in the chiropractic table manufacturing industry, Lloyd Tables contacted CIRAS for help in updating the electronic controls that were being used throughout its product line. The company planned to use this update as a basis for future expansion of other features on its equipment.

CIRAS Industrial Specialist Andrew Bice and ISU computer engineering student Matthew Canny worked with the company to develop a prototype of an electronic control system that incorporated maximum flexibility to adopt future changes in technology. The project was accomplished in a little over a year.

The project started with a technical evaluation of the company's existing instrumentation. Several options surfaced, ranging from simply redesigning the existing human interface to a complex overhaul using the latest in human interface and single board computers.

The company selected the latter. The system included three key components: a computer module, an I/O (input/output) board, and a display/user interface. The idea was to allow the LCD (liquid crystal display), I/O board, and embedded computer to be upgradeable,

while at the same time remain independent of each other. Single board computers, like PCs, are continually dropping in price. Lloyd opted for a module that could take advantage of future price reductions. It consisted of an embedded single board computer with a compact flash hard disk drive, PCI slot, serial port communication, and parallel port communication. The compact flash allowed for easier updates combined with better reliability than the standard hard drives. Similarly, the PCI slot allowed the use of just about any LCD.

The I/O module consisted of a custom I/O board equipped with a programmable microcontroller. The I/O module takes input from the single board computer, table switches, and encoders and sends the information back to the computer. The microcontroller on the I/O board software also allows for future expansion and updates.

An LCD touch screen was used for the user interface of the electronic system. This was the hardest module to implement because there is no single standard for LCDs. Finding one that could handle the graphics, cost, size, and compatibility requirements was a challenging task, but was solved equipping the single board computer with a PCI slot to accommodate the different standards.

In addition to hardware considerations, CIRAS worked with the company on selecting a compatible as well as cost-effective software operating system. The company used Red Hat Linux for development and for embedded operations. "We will make use of the new logic control system as both a sales feature and also as something that adds to the reliability of our product," says Lloyd Table General Manager Michael Hunter. He also adds that over the long run the company will realize cost reductions in not only building material, but also warranty-related costs. ■

*For more information on control systems, electronic design, and product development, contact Andrew Bice at 515-294-4478; [abice@ciras.iastate.edu](mailto:abice@ciras.iastate.edu).*

### **CIRAS Mission Statement**

*The mission of CIRAS is to enhance the performance of Iowa industry and associated entities through education and technology-based services.*

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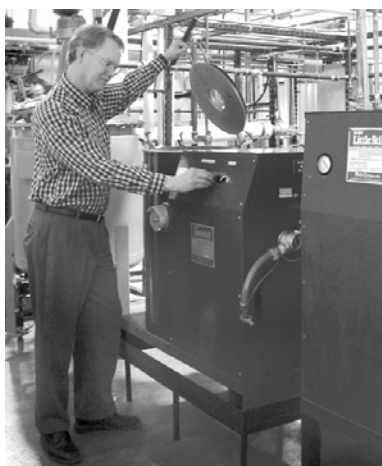
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# The Iowa Energy Center: Working to enhance the value of Iowa's products and services

By Amy Myers, Iowa Energy Center

Despite its relatively small population, Iowa is an energy intensive state. Large amounts of energy are needed to sustain our agricultural and industrial enterprises and to heat, cool, and power our residential and commercial buildings. The Iowa Energy Center works to improve our economy and environment by helping Iowans use energy wisely. Its scope of activities includes industrial energy efficiency, building energy efficiency, renewable resource assessment (wind, solar, hydro, and biomass), biomass to fuels and chemicals, information and education for energy users, and the administration of an alternate energy loan program that provides low-interest financing for constructing renewable energy production facilities in Iowa.

*Jon Van Gerpen, professor of mechanical engineering at ISU, continues to refine his biodiesel pilot plant project located at the BECON facility. Van Gerpen also uses the pilot plant for the laboratory and hands-on training portion of the Biodiesel Workshop Series.*



## Energy efficiency

The Energy Center's Energy Resource Station in Ankeny is a unique testing and demonstration facility that provides practical information on cost-effective, energy-efficient technologies for commercial and industrial buildings. Carefully crafted experiments at the Energy Resource Station are creating better tools for designers so building projects in the future can be more energy efficient. The center is involved in several efforts to bring up-to-the-minute energy information and training on compressed air systems, motors, pumps and other energy-using systems to Iowa industries. The aim is to make these businesses more efficient and cost competitive.

## Renewable and alternate energy

Iowa has tremendous potential for producing energy from renewable resources such as wind, solar, hydro, and biomass. Energy Center-funded research has made possible the most comprehensive wind resource assessment of any state, establishing Iowa as a leader in creating a renewable energy future. Information is available online for developers of wind projects large and small.

The Energy Center is interested in technologies and processes that will advance the state of the art for renewable and alternate energy, particularly as they relate to Iowa's natural and sustainable agricultural resources. An area of increasing activity for the Energy Center is the

production of fuels and chemicals from biomass taking place at the Biomass Energy Conversion (BECON) facility in Nevada. BECON allows researchers to take biomass research activities from lab scale to pilot scale, providing opportunities for business and industry leaders to see alternate energy production options in action.

## Information transfer

An education or information transfer component is required in all Energy Center projects. The center's Web site offers research-based case studies, wind and solar assessments, virtual tours of BECON and the Energy Resource Station, home energy efficiency tips, and links to other energy-related sites.

## Alternate Energy Revolving Loan Program (AERLP)

Created by the state legislature in 1996 as an amendment to the 1990 Iowa Energy Efficiency Act, the AERLP is funded by the state's investor-owned utilities.

The AERLP, which is administered by the center, provides loans to all individuals and organizations (with the exception of utilities not required to be rate regulated) wanting to build renewable energy production facilities in Iowa. Successful applicants receive a single, low-interest loan that consists of a combination of AERLP funds and lender-provided funds. The AERLP provides 50 percent of the total loan, up to a maximum of \$250,000, at zero percent interest. Matching financing for the project must be obtained from a lender of the applicant's choice. As the loans are paid back to the Energy Center, funds revolve back into the program and are made available to new applicants. ■

*For more information on the Energy Center's grant opportunities, projects, or the AERLP, visit the Web site at [www.energy.iastate.edu](http://www.energy.iastate.edu).*

## History and facts

- The Iowa Energy Center was created as part of Iowa's Energy Efficiency Act in 1990. An advisory council representing Iowa's utilities, education/research, and public sectors provides guidance. The Energy Center is administered by Iowa State University.
- The Energy Center is supported by an annual assessment on the intrastate gross operating revenues of all gas and electric utilities in Iowa, amounting to 85 cents from every \$1,000. Funds are used to support research, education, and demonstration projects awarded through a competitive process.
- Those eligible to receive Energy Center grants include Iowa's private nonprofit organizations, foundations, and educational institutions.



# Noise control approaches to manufacturing

By Adin Mann, Department of Mechanical Engineering, ISU

Undesirable vibrations or noise production are often problems manufacturers face in trying to meet regulatory codes or create a more comfortable and safe work environment. The Acoustics Lab at Iowa State University is a comprehensive resource for tackling problems stemming from excessive noise in products and manufacturing processes.

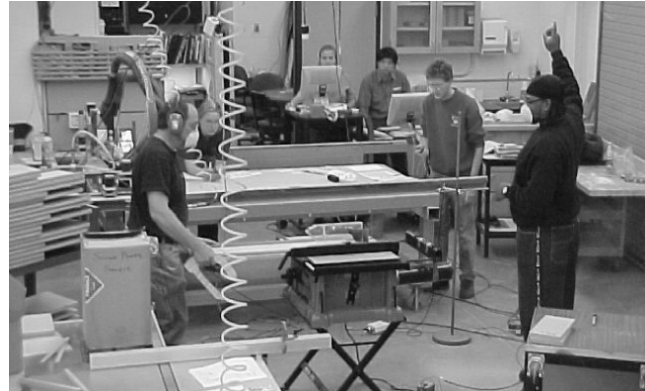
A key strength of the Acoustics Lab is its expertise in both active and passive control, the two strategies employed that help identify and eliminate unwanted noise. Active control involves adding sound or vibration sources to a system to cancel the existing vibration or sound. A passive system reduces the original noise or vibration source or just absorbs the vibration or sound energy. Both can be highly effective and at the same time have nearly no effect. It is important, therefore, that a noise control solution take into consideration using both or either of these strategies. Key issues in noise control methodology involve determining the effectiveness, complexity, and cost of each system.

At the ISU Acoustics Lab, clients receive the best in technological as well as hybrid system applications made possible by the combined expertise of faculty and collaborative work that takes place. Professor Atul Kelkar heads analytical and experimental research to develop active feedback control technologies that can be used in suppressing noise levels in home appliances, industrial machines, machine shops, aircraft cabins, and office spaces. Professor Adin Mann specializes in passive control for similar applications, with current emphasis on flow noise generated by cooling fans and superchargers.

## Facility

Basic research in noise control at the Acoustics Lab has included using high-powered ultrasound on the international space station to remove bubbles from fuel lines. Practical applications have occurred in tractors, refrigerators, vacuum cleaners, and manufacturing equipment.

The acoustics lab includes an anechoic chamber, two vibration isolation mounting slabs, two connected enclosures, and a deep water tank used for underwater sound or watercraft noise studies. The two connected enclosures are used to develop active and passive control techniques for sound transmission through walls, windows, or other structural elements. To support these facilities, there are state-of-the-art data acquisition systems, microphones, a sound intensity system, accelerometers, and force transducers. The data acquisition equipment can be used for both active and passive noise control work. In addition to these traditional noise control facilities, the ISU Acoustics Lab is collaborating with other faculty members who have expertise and experimental facilities to study all the performance aspects of a project.



*The ISU Acoustics Lab conducts a great deal of passive control work on commercial or consumer products. The techniques applied here are similar to industry applications, such as in assembly line grindings and similar processes.*

## Choosing the right approach

As a general reference, a 2 dBA noise reduction is just noticeable and a 10 dBA noise reduction is perceived as making the sound half as loud. At the beginning of any noise control project, it is important to first decide if the goal is to achieve overall noise reductions or to improve the sound quality of the product. Too often, noise control focuses on what engineers assume is the primary noise source, while the true primary noise source is ignored.

At the Acoustics Lab, companies find help in identifying their primary noise sources so that they can direct their cost and time toward solutions that have maximum impact on sound levels or sound quality. For example, it has been estimated that 50% to 90% of the noise in tractors is generated by the engine-cooling fan. This information proved valuable for one company because it was able to avoid developing a new muffler for a part of the tractor that was incorrectly assumed to be the primary noise source.

Once the noise sources are identified and ranked, the next step is to implement the most appropriate control technique. Passive control techniques can be further divided into two categories: 1) source control is where the generation occurs; 2) path control is where the noise is absorbed before it is heard. The following samples of projects use these techniques:

- A combination of controls was implemented in the case of the company (mentioned above) wanting to reduce the noise on its engine cooling fans. A source control was implemented that produced a 9 dBA tone noise reduction and path control was implemented for a 6 dBA overall noise reduction. The source control improved the sound quality, and the path control reduced the overall sound level for regulatory compliance.

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## Contracting with the federal government: Small business opportunities

*Getting Started (Part III)* By Rodney Grandon, Patton Boggs LLP

As noted in Parts I and II (see *CIRAS News*, Spring '03 and Summer '03), there has never been a better time to do business with the federal government. As the commercial sector struggles to rebound from recession, federal spending on goods and services continues to surge. Unfortunately, many businesses, particularly small businesses, are missing potentially profitable opportunities because of the perception that contracting with the federal government is a burdensome and unpleasant experience.

While there remain certain unique aspects to doing business with the federal government, it has, in recent years, become remarkably similar to what businesses should expect to experience in a typical commercial transaction. This is particularly true in procurements for commercial items. Moreover, the federal government has established specific goals for awarding contracts to small businesses.

Part I of this three-part series addressed the competition requirements that govern most federal procurements. Part II focused on the solicitation and award of federal contracts. Part III examines federal small business programs—programs designed to facilitate the award of federal contracts and subcontracts to small business concerns.

### Federal policy

"It is the policy of the government to provide maximum practicable opportunities in its acquisitions to small business, veteran-owned business, veteran-owned small business, service-disabled veteran-owned small business, HUB [historically underutilized business] Zone small business, small disadvantaged business, and women-owned small business concerns. Such concerns must also have the maximum practicable opportunity to participate as subcontractors in the contracts, awarded by any executive agency and consistent with efficient contract performance." Federal Acquisition Regulation (48 CFR19, 19.201a).

### Definitions

A small business is a concern that is organized for profit, has a place of business in the United States, is not dominant in its field, and meets the "size standards" and other criteria established by the Small Business Administration (SBA). (Size standards are expressions of maximum annual revenue or maximum number of employees used to designate small business concerns.

The standards vary greatly from industry to industry. Size standards are listed in the 13 Code of Federal Regulations, Part 121, and can be accessed through [www.sba.gov](http://www.sba.gov).)

A small disadvantaged business (SDB) is a small business that is at least 51% owned by one or more socially and economically disadvantaged individuals or stockholders. One or more disadvantaged individuals must also control the management and daily operations. African Americans, Hispanic Americans, Native Americans, and Asian Pacific Americans are groups that may qualify. SBA is authorized to determine who else qualifies on a case-by-case basis.

A woman-owned small business is a small business that is at least 51% owned by a woman or women who are United States citizens and who also control and operate the business.

A historically underutilized business zone (HUBZone) small business is one that is 100% owned and controlled by United States citizens, and the firm must have its principal office in a HUBZone as determined by the SBA. The principal office must be located where the greatest numbers of the company's employees work at any one location. Further, at least 35% of the small business's employees must reside in the HUBZone.

### Breakfast, Business, & More

The next breakfast will be held **November 6** at 7:30 a.m. at the Des Moines Downtown Holiday Inn, 1050 Sixth Avenue.

**Facilitator:** Ted Williams, CEO, Williams Group, Inc., Des Moines, Iowa.

**Sponsors:** Channell Construction Iowa & Nebraska, Principal Financial Group, and the Minority & Women Business Conference & Expo.

**In cooperation with** IPOC/ CIRAS and Drake Small Business Development Center.

*For reservations, contact Kathy Bryan, (800)-458-4463; [kbryan@ciras.iastate.edu](mailto:kbryan@ciras.iastate.edu)*

### Small business programs and assistance

The federal programs designed to assist small businesses are far too numerous to explore in any detail in this article. Small business set-asides, however, merit special note. A small business set-aside involves reserving an acquisition of a particular supply or service exclusively for participation by small business concerns. Federal contracting officers are specifically charged with the obligation to review and identify acquisitions that can be set aside for small businesses. Moreover, each acquisition of supplies or services that has an anticipated dollar value over \$2,500, but not over \$100,000, is automatically reserved for small business concerns, unless the government does not have a reasonable expectation of obtaining offers from two or more small business concerns. Another important component of expanding small business contracting opportunities is the federal subcontracting program. Firms with large government contracts are required by law to establish goals for awarding subcontracts to qualified small, small

**Continued on page 8**

## Partnerships make for diverse solutions

*Besides cueing in to manufacturing concerns over the years, CIRAS has worked diligently to forge strong partnerships and develop effective outreach programs that offer a diverse range of technical, financial, and management-related resources to Iowa companies and industry.*

In 1994, CIRAS collaborated with Iowa State University (ISU) and the Des Moines Area Community College to establish the Iowa Manufacturing Technology Center (IMTC), a National Institute of Standards and Technology-funded program. The Iowa Small Business Development Center and several technology transfer units from ISU partnered in this venture to provide manufacturers and businesses continuous improvement, financial assistance, human resources, and strategic and tactical planning services. IMTC changed its name to the Iowa Manufacturing Extension Partnership (IMEP) in 1999. The roles of the IMEP and CIRAS were then slightly modified to eliminate overlapping efforts.

CIRAS went worldwide in 1995 when it posted its first Internet Web page, significantly adding to the ease by which Iowans could contact CIRAS staff or just access manufacturing-related resources. Three years later, [PC Novice Guide to the Web](#) selected the site as one of the top 2,500 sites.

In 1996, the Cedar Valley Manufacturer's Association and CIRAS co-sponsored its first business and manufacturing exposition. The expo was a huge success in showcasing engineering, business, management, and marketing issues in manufacturing.

During the same year, a plant layout project with Brown Medical Industries in Spirit Lake, Iowa, demonstrated how ISU students successfully brought their talents and skills to solving manufacturing problems. Today, supervised by CIRAS staff, students contribute a wealth of knowledge and expertise to CIRAS activities.

True to its original mission, CIRAS continues to disseminate knowledge by hosting and organizing statewide seminars, presentations, and events. Topics have ranged from ISO 9000 and Theory of Constraints to strategic planning, OSHA compliance, and engineering services. In 2000, the Industry Outreach Center in Cedar Falls opened its doors to provide Iowa businesses with one more avenue to access knowledge and technical expertise. The center's affiliation with Total Systems Network has made possible live satellite downlink seminars and workshops presented by international experts in the field. The first E-Business conference, held in 2001, introduced the power of the Internet, including high-tech 21st-century solutions.

Over the past decade, CIRAS has expanded its network through existing as well as new partnerships. In 2000 the Iowa Procurement Outreach Center (IPOC) and Engineering Distance Education (EDE) came under the CIRAS administrative umbrella, increasing the scope of support for manufacturers. On July 1, 2002, after 90 years as a separate entity, Engineering Extension Services became a part of the CIRAS administrative structure, creating a more seamless link between manufacturers and the faculty in the College of Engineering.

Finally, federal grants have come to play a prominent role in how CIRAS is able to promote and foster economic growth and diversity in Iowa. A national certification program that involves cooperation between CIRAS, the USDA, and Iowa State University has resulted in a concerted effort to identify, qualify, and label biobased products for federal procurement.



# Past service inspires plans for future growth

By Sunanda Vittal, Engineering Communications and Marketing

For Andy Brosius, working with CIRAS has meant traveling down a path of growth and opportunities. Brosius is president of Midwest Industries, located in Ida Grove, an internationally recognized manufacturer and distributor of hoists, docks, trailers, and trailer hitches used in recreational and farm vehicles.

Ever since its founder, CEO, and leading innovator Byron L. Godbersen patented the Bolster Hoist (a wagon hoist used to tilt grain boxes) in 1954, Midwest products such as ShoreLand'r, Shore Station, and Freedom Hitches have become the industry standard for safe and reliable operation of marine and farm equipment.

When Brosius took charge of operations in 1989, Midwest Industries was a fast-growing company with a succession of new products hitting the market. They included trademarks such as ShoreLand'r boat trailers and ShoreStation aluminum hoists.

While the products enhanced company growth and visibility, Brosius wanted to focus on another aspect of operations: instituting customer surveys. In 1997, he contacted CIRAS Industrial Specialist Tim Sullivan for help in developing a comprehensive customer relationship survey that would elicit information identifying needs and preferences and provide insights into ways to improve customer satisfaction levels. The project helped the company zero in on specifics, says Brosius, which were then earmarked for change and remediation.

A second project with Sullivan involved implementing the Theory of Constraints in production. A drum/buffer/rope approach to the problem helped the company streamline the production process. "We achieved significant gains in on-time delivery performance, improved productivity, and improved financial performance as a result of the implementation," recalls Brosius. In recent years, CIRAS has directed Midwest Industries to the Iowa Procurement Outreach Center (IPOC) to consider business transactions with the federal government. This new direction, Brosius feels, will help the company expand its markets into a hitherto unexplored business arena.



Andy Brosius, President, Midwest Industries

If you press Brosius on why Midwest chose CIRAS over the years as its primary source for solutions, he replies: CIRAS brought to the table what many other resources didn't, namely, "credible consulting assistance that's accessible and affordable." Moreover, working with Tim Sullivan, states Brosius, has proved beneficial. "Tim demonstrated excellent knowledge and skills in the two projects, and he is well respected in our organization," says Brosius.

Championing the cause of employee participation is an issue Brosius undertook decisively in the late 1980s. "Management realized that we needed to make changes if we were to survive and prosper in the long run," he recounts. Midwest Industries, accordingly, poured its efforts into empowering employees with a voice in problem-solving as well as decision-making tasks that have, in the past two decades, been key to growth and development.

Forward thinking plus a lengthy association with CIRAS has helped Midwest Industries achieve many milestones in successful products and new directions for growth. In fact, adds Brosius confidently, "we would not hesitate working with CIRAS in the future as opportunities present themselves." ■

## 1999

- is declared nation's top site for Theory Of Constraints information after nearly 300 people participate in a CIRAS-organized satellite program presented by Dr. Eli Goldratt

- establishes the Lloyd Anderson Superior Service to Industry award

## 2000

- Iowa Procurement Outreach Center is moved from the Iowa Department of Economic Development to CIRAS

- begins administration of Engineering Distance Education

## 2000

- opens Industry Outreach Center in Cedar Falls

- holds the first Midwest E-Business conference

## 2001

- works with Iowa industry experts and business planners on first business start-up manual for value-added pork production

## 2002

- publishes the bioeconomy vision and roadmap for Iowa

- merges with Engineering Extension Service, which started in 1913



**Continued from page 5**

disadvantaged, women-owned small, and HUBZone small businesses. Each prime contract of \$500,000 or more (\$1 million for construction) must include subcontracting goals and a plan for meeting those goals.

The Small Business Administration is the primary federal agency charged with assisting small businesses. The SBA fulfills its mission in a variety of ways, including providing loans and grants to fledgling businesses, providing information to owners on how to run a business, and helping small businesses identify and develop federal contracting and subcontracting opportunities. The SBA recently developed Pro-Net to help promote small business contracting opportunities. Pro-Net is an electronic gateway of procurement information that can be accessed through [www.sba.gov](http://www.sba.gov). Small businesses prepare and enter profiles

(essentially an executive business summary) into the Pro-Net database. The Pro-Net database can be accessed by federal, state, and local governments as well as prime and other contractors seeking small business contractors, subcontractors, and even partnering opportunities. Pro-Net provides a valuable marketing tool for small businesses, with links to other federal procurement opportunities.

Other federal agencies also are required to develop and use small business programs. These programs generally include outreach activities, both to inform small businesses about what the agency has to offer and to help small businesses make the right contacts within the agency. Most federal small business programs (e.g., Department of Defense Office of Small and Disadvantaged Business Utilization, Mentor/Protégé Programs, and SBA's 8a Business Development) can be accessed through links at [www.sba.gov](http://www.sba.gov).

This series of articles regarding contracting with the federal government has provided basic information on the federal contracting process and essential information on taking advantage of federal contracting opportunities. The next step, of course, is up to you. ■

*Rodney Grandon is a partner with the law firm Patton Boggs LLP, 2550 M Street, N.W., Washington, D.C. 20037, 202-457-6061, [rgrandon@pattonboggs.com](mailto:rgrandon@pattonboggs.com). This is the final article of a series that appeared in the Waterloo Chamber of Commerce Business Perspectives in 2002.*

## Correction

CIRAS Advisory Council member Roger Stoneking's name was misspelled in the last issue of the CIRAS newsletter. Stoneking is President of Blue Wave Ultrasonic. Founded in 1952, the company manufactures heavy-duty ultrasonic cleaning equipment that uses high-frequency sound waves to remove contaminants in a range of products, from delicate and intricate aircraft parts to laboratory equipment to machine parts in the manufacturing industry. Blue Wave Ultrasonic is located in Davenport.

## Noise control

**Continued from page 4**

- In another project, the motor inside a vacuum cleaner was identified as the primary noise source, and the cooling fan in the motor was identified for source control. Since the company had purchased the motor and would lose control of any design solution for the cooling fan noise, it opted for path control because that was the part of the product design that the company could protect. The vacuum cleaner body, therefore, was used instead to keep the noise within the vacuum cleaner, where it was absorbed. In this case, an overall noise reduction was obtained, resulting in improved sound quality.
- In the case of another vacuum cleaner, the company purchased enough vacuum cleaner motors that it was able to protect the motor design. Here, reducing the noise source inside the motor was an option. The work began with identifying the source of an annoying tone produced in the vacuum cleaner motor. The redesigned motor had an overall noise reduction of 5.5 dBA and a tone noise reduction of 13 dBA. The tone noise reduction was particularly noticeable because it removed the annoying whine that accompanies most vacuum cleaners.

## Improving product performance

One underlying philosophy of passive noise control is that noise sources are often the sources of inefficiencies in a system. Therefore, it is possible with passive control to increase a system's performance along with reducing noise levels. In all three instances below, a poor airflow environment created noise. Correcting the airflow thus reduced the noise and increased the airflow performance of the device.

- In the case of a modified vacuum cleaner motor, the modifications for noise control also increased the performance of the motor by 26%, with a 6% lower rotation rate. Further modifications of the vacuum cleaner netted a 200% increase in the vacuum cleaner's performance.
- In another example, the motor driving a fan on a refrigerator was replaced with a lower power motor, producing a 3 dBA noise reduction while maintaining air flow performance.
- In a third example, the blades and deck on a lawnmower were modified, producing a 3 dBA overall noise reduction along with increased air flow, indicating an increased cutting and bagging performance. ■

*For more information on noise control methods, contact Adin Mann at 515-294-2877, [jamann@iastate.edu](mailto:jamann@iastate.edu), or Jeff Mohr, CIRAS, at 515-294-8534, [jmohr@ciras.iastate.edu](mailto:jmohr@ciras.iastate.edu).*

# CIRAS 2003 ANNUAL REPORT

University Extension

IOWA STATE UNIVERSITY

College of Engineering

**CIRAS Mission Statement:** *The mission of CIRAS is to enhance the performance of Iowa industry, and associated entities, through education and technology-based services.*

## From the Director

2003 marks CIRAS's fourth decade of service to Iowa manufacturers, but our 40-year anniversary is somewhat bittersweet. Despite substantial growth in the manufacturing sector in the nineties, the downturn of the past few years continues to linger. In Iowa, manufacturing jobs decreased by 6,000 this past year, more than any other economic sector.

Despite the slowdown in the economy, there continues to be a degree of optimism among manufacturers. Many we have worked with have voiced cautious optimism because of increases in orders for the next few quarters. We have also received many positive responses regarding our work with companies that use biomass as feedstocks, the bioindustry sector.

This past year USDA awarded Iowa State and CIRAS a contract to assist in the development of the national USDA biobased product certification program. While benefiting the entire country, there is likely to be amplified local payback due to the proximity of the nation's biomass to Iowa.

The bioeconomy vision and roadmap that Iowa industry developed through their partnership with ISU and the Department of Energy has received national acclaim and has brought international exposure to ISU and CIRAS. As a result of this process, the industry leaders have established a non-profit organization, BIOWA, to pursue the development of biorefineries in the state.

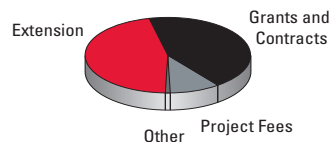
CIRAS involvement with economic development efforts, like BIOWA, will likely continue to expand as state agencies work to coordinate services. The relocation of Mastercraft to Iowa is an example of a coordinated economic development effort. Council Bluffs Chamber of Commerce, Iowa Western Community College, IMEP, and CIRAS staff worked together to deliver a broad range of services, which included CIRAS involvement in the layout of their new Iowa plant. Examples of additional projects that we completed this past year are highlighted on the reverse side. The map conveys the extent to which we have been able to reach out to industry across the state.

We received two national awards recognizing the quality of our programming. The engineering team received an award from the National Association of Management and Technical Assistance Centers for their product design work with Ames-based CombiSep, Inc. Paul Jewell led a team that developed multicast videoconferencing capability via satellite and received the Bill Murphy Barrier Buster award by the American Distance Education Consortium.

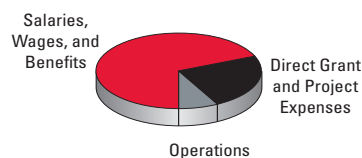
Recently, a former CIRAS advisory council member eloquently penned in a letter to the Governor, "CIRAS is one organization that not only pays its way, it 'paves the way.'" CIRAS is committed to helping Iowa manufacturers pave the way to economic recovery. We look forward to another 40 years of being that unbiased colleague that you can turn to for guidance, education, and assistance as you help grow Iowa's economy.

*Ronald A. Cox*

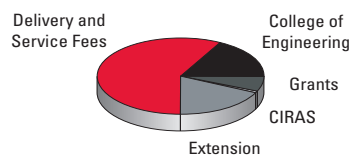
**CIRAS Income**  
Total Income = \$2,684,152



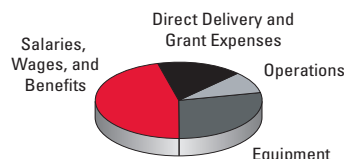
**CIRAS Expenses**  
Total Expenses = \$2,501,374



**EDE Income**  
Total Income = \$646,947



**EDE Expenses**  
Total Expenses = \$614,701



## Iowa Manufacturing Profile

Iowa is home to 5,772 manufacturing establishments. The three areas below reflect how the manufacturing sector plays out as a portion of the state's total economic activity:

Labor Force .....	16%
Work Earnings .....	19%
Gross State Product .....	21%

## CIRAS Staff

- Verl Anders
- Andrew Bice
- Jim Black
- Donald Brown
- Ronald Cox
- Clay Crandall
- Steve Devlin
- Jill Euken
- Paul Gormley
- Dawn Hines
- Jeffrey Mohr
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- Timothy Sullivan
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- Steven Vanderlinden
- John Van Engelenhoven
- Michael Willett

## Iowa Procurement Outreach Center

- Kathleen Bryan
- Bruce Coney

## Engineering Distance Education

- Hiro Iino
- Paul Jewell
- Joe Monahan
- Pam Shill

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# 2002–2003 Highlights

## Engineering

- Iowa Companies Assistance Program, ISU aerospace engineering faculty, and CIRAS helped Hugg Manufacturing in Westside develop a portable winch. The company received assistance in load testing, materials selection, and welding and design issues. Annual sales of \$200,000 are anticipated.
- WAYNE Engineering in Cedar Falls worked with CIRAS in modifying refuse compaction assemblies. “With CIRAS help and guidance, the company was able to foresee how the structure would react,” – WAYNE Product Engineering Manager.
- The Iowa EDA University Center, located at CIRAS, provided product design assistance to rural Iowa companies, such as the Maytag facility in Amana, Kangaroo Recreation in Ely, E-Ject Systems in Elkader, and Al-Jon Inc. in Ottumwa in product design areas.

## Management Practices

- CIRAS, ISU Extension Value Added Agriculture, and the Center for Advanced Technology Development conducted a feasibility study for PEC, Inc. in Waukon to help the company apply for a U.S. Department of Agriculture rural development loan guarantee.

## Government Procurement

- The Procurement Technical Assistance Center (PTAC) reported that 546 jobs were created as a result of contracts awarded to companies that received assistance from IPOC and CIRAS staff. IPOC is funded through the Defense Logistics Agency, the Iowa Department of Economic Development, and ISU Extension.
- The third annual business showcase had over 100 attendees from state, federal, and local agencies. The event provided small businesses from across Iowa an opportunity to meet government and commercial purchasing agents and obtain solicitations for bids.

## Productivity

- CIRAS worked with state economic development agencies assisting Mastercraft Furniture relocate from Omaha to Council Bluffs. The move generated 50 new Iowa jobs and over \$2 million in investments in plant operations and equipment.
- A Kaizen team at Britz-Heidbrink, Inc. in Monona implemented over 100 ideas with CIRAS assistance. “The impact on our business was immediate. By analyzing the full value stream, our team reduced our product leadtime by 50%, which greatly reduced costs.” — Britz-Heidbrink.
- CIRAS assisted Centerville Machining Inc., Centerville, with its management techniques, improving cash flow and reducing lead-time. CIRAS assistance resulted in annual cost savings of \$290,000 and increased sales of \$440,000. “Without the help of CIRAS, we would not be in business now” – Centerville Machining Inc.

## Quality

- Diversified Fastening System, Inc. in Charles City worked with CIRAS on implementing ISO 9000. The company reported hiring 10 more employees, adding a new building, buying additional equipment, and gaining new customers as a direct result of the implementation.
- CIRAS continued to work with university staff, Iowa companies, ISO registrars, and the American Society of Agricultural Engineers to develop an ISO 9001:2000 standard for agriculture.

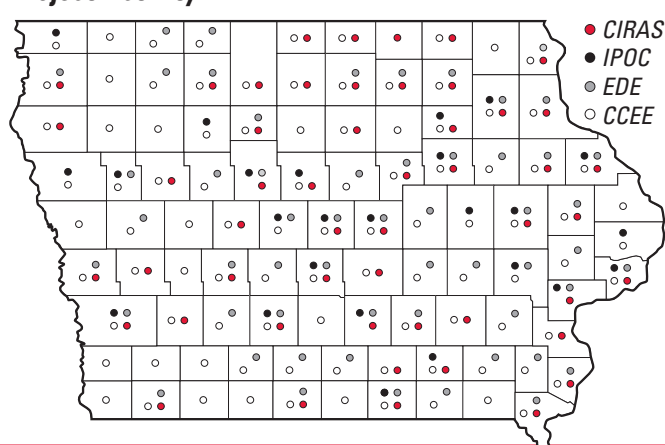
## National Initiatives

- CIRAS partnered with the Iowa Manufacturing Extension Partnership, Iowa Energy Center, and MidAmerican Energy in a U.S. Department of Energy plant-wide assessment of North Star Steel Iowa in Wilton. The team identified potential savings of over \$1,000,000. The project will serve as a case study for all steel producing mini-mills.
- The USDA and CIRAS are collaborating on developing a national certification program to identify, qualify, and label biobased products for federal procurement.
- CIRAS participated in a National Renewable Energy Laboratory (NREL)- sponsored grant to develop educational material and pilot teach a biodiesel technology workshop. Over 175 people from 33 states and 11 foreign countries attended the seminars.
- The Iowa Industries of the Future program began working with the food processing industry, the largest industry in Iowa. The program is a joint venture with the Department of Energy, the Iowa Department of Natural Resources, and the Iowa Energy Center.
- Maytag in Newton has partnered with the Department of Health and Human Services and CIRAS to develop a prototype of a universal design kitchen system that will meet the needs of older people.

## Continuing Education

- EDE delivered distance education courses to 752 students, which included 447 Iowa students.
- Extension staff from ISU's Department of Civil, Construction, and Environmental Engineering offered courses and workshops attended by over 1,800 engineers from across the state.

## Project Activity



# Iowa EDA University Center—on track and growing

By John Roberts, CIRAS

The Economic Development Administration's (EDA) University Center has operated within CIRAS since the EDA began at Iowa State University (ISU). The program provides technical assistance to entrepreneurs and small manufacturers in rural Iowa communities for developing start-up companies or in implementing new technologies. The EDA University Center utilizes on-campus research lab facilities as well as faculty and student expertise.

In 2002 the Iowa EDA University Center provided technical assistance to 28 manufacturers, including two recently established companies. Technical assistance took place in three areas: product development, technology transfer and education, and access to technical knowledge. The following projects illustrate the breadth and scope of EDA assistance.

The Maytag facility in Amana, Iowa, wanted to add a new feature to one of its residential appliances. An EDA University Center project team that included Maytag engineers developed a prototype for an innovative concept using 3-D CAD solid modeling. Maytag executives plan to use the prototype in their ongoing developmental efforts. Funding was provided by the EDA University Center and the Institute for Physical Research and Technology (IPRT).

Kangaroo Recreation Company in Ely, Iowa, was exploring a new design to accommodate easier set-up and dismantling procedures of its product, Jump-Shot™, a two-player basketball game. EDA University Center engineers and students developed alternative designs and created visual simulations. A prototype was developed, and Kangaroo Recreation plans to have new models ready for sale within the year. Funding was provided by the EDA University Center and IPRT.

E-Ject Systems Equipment in Elkader, Iowa, requested assistance in structural analysis of a disk harrow used for road construction. EDA University Center students created a 3-D CAD solid model and, using Finite Element Analysis,

examined the stress distribution. The project provided E-Ject Systems insight into the design of its product. Funding was provided by the EDA University Center and IPRT.

Al-Jon Inc., located in Ottumwa, Iowa, worked with the EDA University Center and the Iowa Companies Assistance Program (ICAP) on metallurgical analysis, load determination, lubrication, pin materials and heat treatments, and bearing designs. Al-Jon decided to redesign its rear axle assembly incorporating the new bearings.

Sandra Lunde from Ellsworth, Iowa, owner of Casual Cuts, developed a specialized hair clip for use by hair salons. The EDA University Center and a professor from ISU's Industrial Technologies Program assisted in developing the design and prototype parts. Lunde has decided to have the parts manufactured, while she focuses on marketing, sales, and distribution. Funding was provided by the EDA University Center and IPRT.

Dr. Bradley Randolph from Burlington, Iowa, owner of Randolph Dental, had patented the concept of a disposable paste-dispensing prophylaxis angle, an orthodontic device. EDA University Center engineers and students arrived at two final designs, which were then fabricated and tested. Randolph plans to approach manufacturers or distributors to continue developing the product. Funding was provided by the EDA University Center and IPRT.

Judy Hoit from Iowa City, Iowa, is a paraplegic who developed a personal mobility sling for assisting with the transfer of individuals with physical limitations. The EDA University Center worked with Hoit, ICAP, and ISU's Structures Lab in evaluating a sling and developing a method to test it. This analysis helped Hoit start a company called Access Now, which markets and distributes the PAKKYE Personal Mobility Sling. ■

*For more information on EDA, contact John Roberts, CIRAS, 515-294-0932, [jroberts@ciras.iastate.edu](mailto:jroberts@ciras.iastate.edu).*

## EDE staff member heads "barrier busting" team

In a groundbreaking event on April 2, 2003, the American Distance Education Consortium's (ADEC) Advanced Internet Satellite Extension Project Team successfully transmitted its National Science Foundation Project Update Conference to over 60 project test sites nationwide, using IP multicast networking and a digital satellite Internet system. The team was recognized for this achievement with ADEC's 2003 Bill Murphy Barrier Buster Award. Team leaders included EDE staff member Paul Jewell, along with engineers from the University of Nebraska-Lincoln, working closely with San Diego-based satellite broadband communications network, Tachyon, Inc.



*College of Engineering Dean James Melsa (center) presents ADEC award to EDE staff members: from left, Hiro Iino, Joe Monahan, Melsa, Paul Jewell, and Paul Lustgraaf (Academic Information Technology) Not pictured: Ben Vaughan (Engineering Computing Support Services)*



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**Check out pages 6 and 7 for a historical CIRAS timeline.**

**WebWatch: Managing a business**

[www.ciras.iastate.edu](http://www.ciras.iastate.edu)

Using sound marketing and accounting practices as well as appropriate technology-based tools often determines how well a company manages its resources and assets. Below are ideas to boost a company's overall productivity and performance that invite a closer look:

- Feasibility studies—what are they? And how do they impact growth?
- Manufacturing and accounting software—what's on the market and do they work?
- Strategic planning—can it really make a difference?
- Financial management—how can it deliver success?

Learn more about these concepts and the latest in business management tools at [www.ciras.iastate.edu](http://www.ciras.iastate.edu).



**Focus: Management Practices**

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